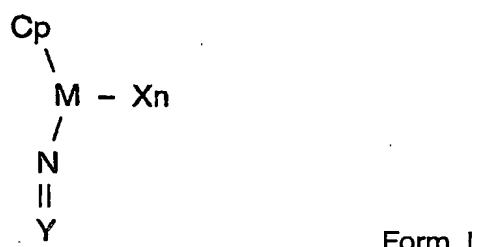


CLAIMS.

1. Process for the preparation of a polymer comprising monomeric units of ethylene, an α -olefin and a vinyl norbornene applying as a catalyst system:

- a bridged or an unbridged group 4 metal containing an unbridged catalyst having a single cyclopentadienyl ligand and a mono substituted nitrogen ligand, wherein said catalyst is defined by the formula I:
- an aluminoxane activating compound,
- 0 - 0.20 mol per mol of the catalyst of a further activating compound,

10



wherein Y is selected from the group consisting of:

ai) a phosphorus substituent defined by the formula:

15



wherein each R¹ is independently selected from the group consisting of a hydrogen atom, a halogen atom, C₁₋₂₀ hydrocarbyl radicals which are unsubstituted by or further substituted by a halogen atom, a C₁₋₈ alkoxy radical, a C₆₋₁₀ aryl or aryloxy radical, an amido radical, a silyl radical of the formula:

20



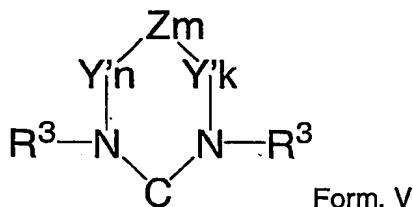
wherein each R² is independently selected from the group consisting of hydrogen, a C₁₋₈ alkyl or alkoxy radical, C₆₋₁₀ aryl or aryloxy radicals, and a germanyl radical of the formula:



25

wherein R² is independently selected from the group consisting of hydrogen, a C₁₋₈ alkyl or alkoxy radical, C₆₋₁₀ aryl or aryloxy radicals, ai) a substituent defined by the formula:

- 20 -



wherein each of Y is CR³R³, C=C R³R³, C=N R³, SiRR, C=O, N R³, P R³, O or S,

Z is -A=A, and each A is CR³, N or P,

5 each R³ is independently selected from the group of hydrogen, hydrocarbyl radical, silyl radical according to form. III or germanyl radical according to form.

IV,

k, m and n have independently the value 0, 1, 2 or 3, provided that k + m + n > 0 and

10 aiii) a substituent defined by the formula:

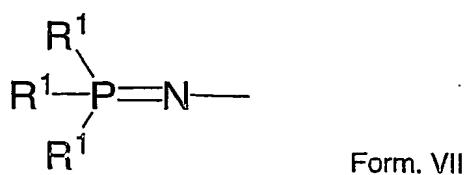


wherein each of Sub¹ and Sub² is independently selected from the group consisting of hydrocarbyls having from 1 to 20 carbon atoms, silyl groups, amido groups and phosphido groups.

15 Cp is a ligand selected from the group consisting of cyclopentadienyl, substituted cyclopentadienyl, indenyl, substituted indenyl, fluorenyl and substituted fluorenyl; X is an activatable ligand and n is 1 or 2, depending upon the valence of M and the valence of X; and

M is a group 4 metal selected from the group consisting of titanium, hafnium and zirconium.

20 2. Process according to of claim 1, wherein the catalyst used contains a phosphinimine ligand which is covalently bonded to the metal, defined by the formula:



25 wherein each R¹ is independently selected from the group consisting of a

hydrogen atom, a halogen atom, C₁₋₂₀ hydrocarbyl radicals which are unsubstituted by or further substituted by a halogen atom, a C₁₋₈ alkoxy radical, a C₆₋₁₀ aryl or aryloxy radical, an amido radical, a silyl radical of the formula III and a germanyl radical of the formula IV.

- 5 3. Process according to claim 2, wherein the catalyst comprises as phosphinimine ligand tri-(tertiary butyl) phosphinimine.
4. Process according to any one of claims 1-3, wherein the alumoxane used is of the formula: (R⁴)₂AlO(R⁴)_mAl(R⁴)₂ wherein each R⁴ is independently selected from the group consisting of C₁₋₂₀ hydrocarbyl radicals and m is from 0 to 50.
- 10 5. Polymer obtainable by the process of any one of claims 1-4.
6. Polymer according to claim 5, wherein
[VNB] > 0.01 and
 $\Delta\delta > 30 - 15 * [VNB]$, provided that $\Delta\delta$ is not negative,
[VNB] is the content of vinyl norbornene in the polymer in weight % and
15 $\Delta\delta$ is, expressed in degrees, the difference between the phase angle δ at an angular frequency of 0.1 rad/s and the phase angle δ at an angular frequency of 100 rad/s, as measured by dynamic mechanical spectroscopy, at a temperature of 125°C.
7. Polymer according to claim 6, wherein $\Delta\delta > 35 - 15 * [VNB]$.
- 20 8. Polymer according to any one of claims 5-7, wherein the content of vinyl norbornene is between 0.1 and 4 weight %.
9. Polymer according to any one of claims 5-8, wherein the polymer comprises at least 0.01 weight % 5-ethylene-2-norbornene.
- 25 10. Polymer according to any one of claims 5-9, wherein $\Delta\delta > 25 - 12.5 * (Q-2)$, whereby Q = Mw/Mn, Mw is the weight average molecular weight and Mn is the number average molecular weight.